CLAIMS

We claim:

1. A system for illuminating a target area of an eye treated with a photosensitizer, the system comprising:

a contact portion configured to interface with the eye to provide an optical path between the eye and the system;

a plurality of light emitters configured to emit light having an emissions spectrum with at least an activation wavelength of the photosensitizer;

a selective reflector configured to reflect at least a majority of light having the activation wavelength of the photosensitizer and to pass at least some light having wavelengths other than the activation wavelength, the selective reflector positioned to receive emitter light and to direct a portion of the emitter light reflected from the selective reflector toward the contact portion, the selective reflector positioned to receive and pass a portion of light reflected from the eye and passed by the contact portion; and

a visualization portion positioned to receive and pass that portion of light reflected from the eye and passed by the selective reflector.

2. The system of claim 1 wherein the visualization portion is one of the following: an optic lens and a pane.

3. The system of claim 1 for use with one of a microscope and a video camera wherein the visualization portion optically interfaces to at least one of the microscope and the video camera.

4. The system of claim 1, further comprising a controller configured to control intensity of the emitter light from the light emitters between at least two levels: a

treatment level having an intensity level sufficient to activate the photosensitizer and a targeting level having an intensity level insufficient to activate the photosensitizer.

5. The system of claim 1 wherein each of the light emitters includes at least one of the following: laser diodes, light emitting diodes, liquid crystal display, coherent fiber, incandescent bulbs, and fluorescent tubes.

6. The system of claim 1 wherein each of the light emitters has a light source and includes a lens having a focal length and being spaced from the light source of the light emitter by substantially the focal length of the lens.

7. The system of claim 1 wherein the light emitters are arranged in at least one of the following arrays: square, rectangular, circular, oval, symmetrical, and non-symmetrical wherein the arrays are at least partially populated by the light emitters.

8. The system of claim 1 wherein the contact portion is rotatably coupled to another portion of the system to manipulate intensity of the emitter light received by the target area of the eye.

9. The system of claim 1 wherein the selective reflector has a reflection efficiency greater than 99% for light having a wavelength equal to the activation wavelength and a reflection efficiency greater than 80% and less than 99% for light having a wavelength in a first identified group of wavelengths different than the activation wavelength.

10. The system of claim 1, further comprising a computer linked to the light emitters, the computer configured to display input controls for selection of which light emitters to activate.

11. A system for illuminating a target area of an eye, the system comprising:

a plurality of light emitters; and

a selective reflector positioned to receive emitter light and to direct a portion of the emitter light to be received by the eye, the selective reflector positioned to receive and pass a portion of light reflected from the eye.

12. The system of claim 11, further comprising:

a contact portion configured to interface with the eye to provide an optical path between the eye and the system; and

a lens positioned between the selective reflector and the contact portion, the lens shaped to direct, at least in part, reflected emitter light toward the target area of the eye, the lens further shaped to direct, at least in part, a portion of the light reflected from the eye to be passed by the selective reflector onto an image plane, the selective reflector being located between the lens and the image plane.

13. The system of claim 11, further comprising:

a lens positioned between the plurality of light emitters and the selective reflector, the lens shaped to direct, at least in part, emitter light to be reflected off of the selective reflector toward the target area of the eye.

14. The system of claim 11, further comprising a computer linked to the light emitters, the computer configured to display input controls for selection of duration and intensity of the emitter light.

15. The system of claim 11, further comprising an electronic image capture device positioned to receive as an image a portion of the light passed by the selective reflector.

16. The system of claim 15, further comprising:

a controller electrically coupled to the plurality of light emitters to selectively activate ones of the light emitters;

an electronic monitor electrically coupled to the electronic image capture device to display images captured by the electronic image capture device; and

a touch screen device overlayed onto the electronic monitor, the touch screen device electrically coupled to the controller to select activation of the light emitters.

17. The system of claim 15 wherein the electronic image capture device is a video camera.

18. The system of claim 11, further comprising a computer linked to the light emitters, the computer configured to display input controls for selection of which light emitters to activate.

19. The system of claim 18 wherein the selective reflector is configured to pass the portion of light reflected from the eye such as to produce a viewable image to assist in selection of which light emitters to activate to emit a pattern of emitter light shaped to approximate the target area of the eye.

20. The system of claim 11 wherein the selective reflector is movably mounted such that position of the selective reflector with respect to the plurality of light emitters is adjustable.

21. The system of claim 20 wherein the selective reflector is movably mounted through a pivotal coupling.

22. A system for illuminating a target area of an eye, the system comprising:

a light emitter; and

a selective reflector positioned to receive emitter light and to direct a portion of the emitter light to be received by the eye, the selective reflector positioned to receive and pass a portion of light reflected from the eye.

23. A system for illuminating a target area of an eye treated with a photosensitizer, the system comprising:

a contact portion configured to interface with the eye to provide an optical path between the eye and the system; and

a plurality of light emitters configured to emit light having an emissions spectrum with at least an activation wavelength of the photosensitizer and movably mounted such that position of the plurality of light emitters with respect to the contact portion is adjustable.

24. The system of claim 23, further comprising a selective reflector positioned to receive emitter light and to direct a portion of the emitter light toward the contact portion, the plurality of light emitters movably mounted such that position of the plurality of light emitters with respect to the selective reflector is adjustable.

25. The system of claim 23 wherein the light emitters are moveably mounted through a rotational coupling.

26. The system of claim 23 wherein the light emitters are moveably mounted through a slideable coupling.

27. A method for illuminating a target area of an eye, the method comprising:

emitting light having an emissions spectrum with at least an activation wavelength of a photosensitizer; and

simultaneously reflecting a portion of the emitted light toward the target area of the eye and passing at least a portion of light that had been reflected off of the eye for observation of the eye.

28. The method of claim 27 wherein the emitting light is performed during a targeting period with an intensity insufficient to activate the photosensitizer and during a treatment period with an intensity sufficient to activate the photosensitizer.

29. A method for illuminating a target area of an eye, the target area having a shape, the method comprising:

selecting from a plurality of light emitters, ones of the emitters to activate based upon the shape of the target area;

emitting light from the selected emitters;

simultaneously reflecting a portion of the emitted light from the selected emitters and directing the reflected light toward the target area of the eye and passing a portion of light that had been reflected off of the eye; and

using at least a portion of light reflected off of the eye that has been passed to observe the eye.

30. The method of claim 29, further comprising:

aligning the reflected emitted light with the target area.

31. The method of claim 30 wherein the aligning includes at least one of the following: the selecting the ones of the emitters to activate, adjusting position of the light

emitters relative to the target area, and adjusting position of a selective reflector used for the simultaneous reflecting and passing relative to the light emitters.

32. A method for illuminating a target area of an eye, the target area having a shape, the method comprising:

selecting from a plurality of light emitters ones of the light emitters to activate based upon the shape of the target area;

emitting light from the selected light emitters; and

directing the emitted light toward the target area of the eye.

33. A method for illuminating a target area of an eye using a plurality of light emitters, the method comprising:

emitting light from at least a portion of the plurality of light emitters;

directing a portion of the emitted light toward the target area of the eye;

directing a portion of light reflected off of the eye;

capturing a portion of the passed light; and

displaying an image based upon the captured light.

34. The method of claim 33, further comprising selecting ones of the light emitters to emit light from based upon the displayed image.